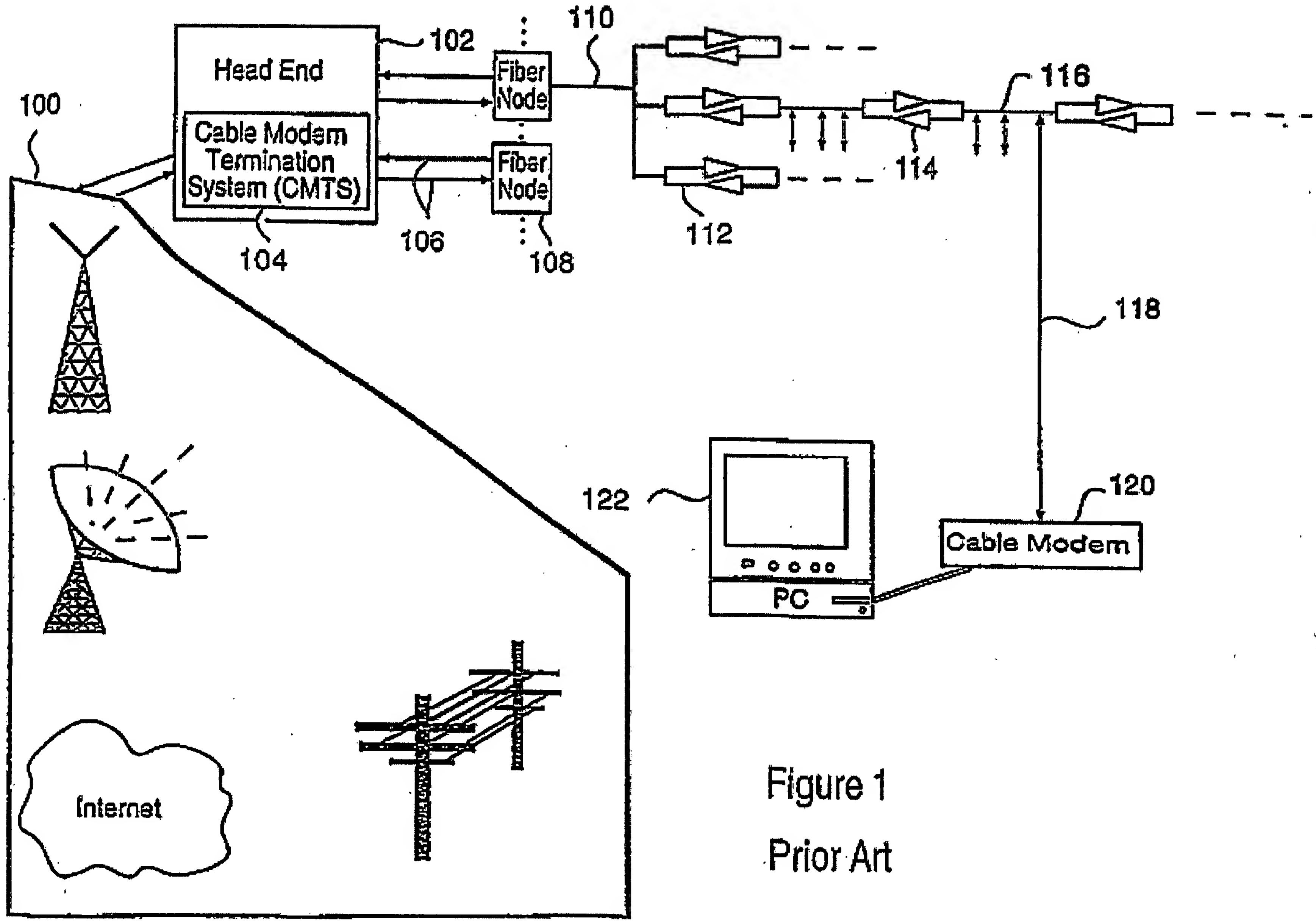

Figure 1
Prior Art

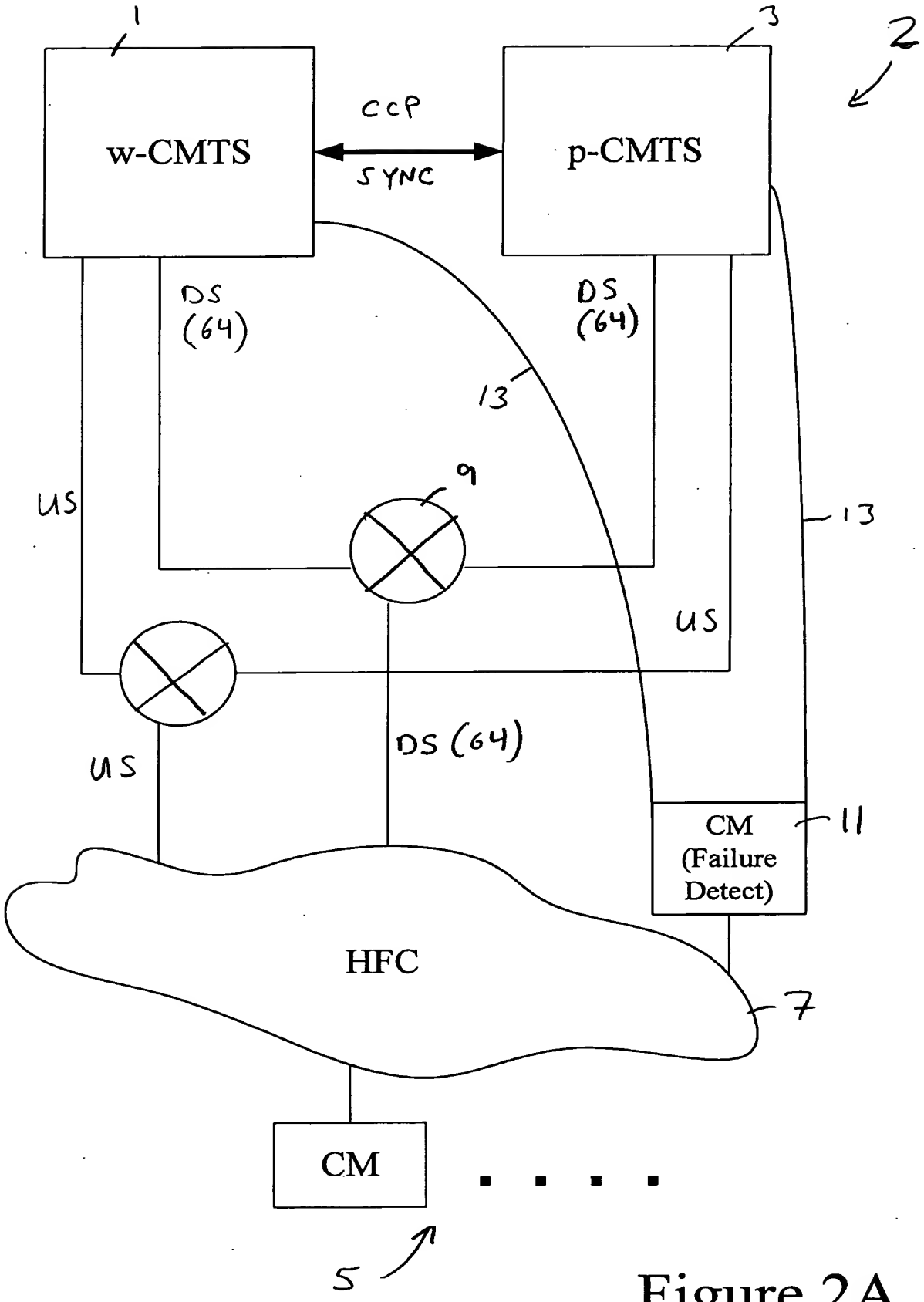
1
3
2
w-CMTS
CCP
SYNC
p-CMTS
DS
(64)
DS
(64)
13
9
US
13
US
US
DS (64)
CM
(Failure
Detect)
11
HFC
7
CM
5

Figure 2A

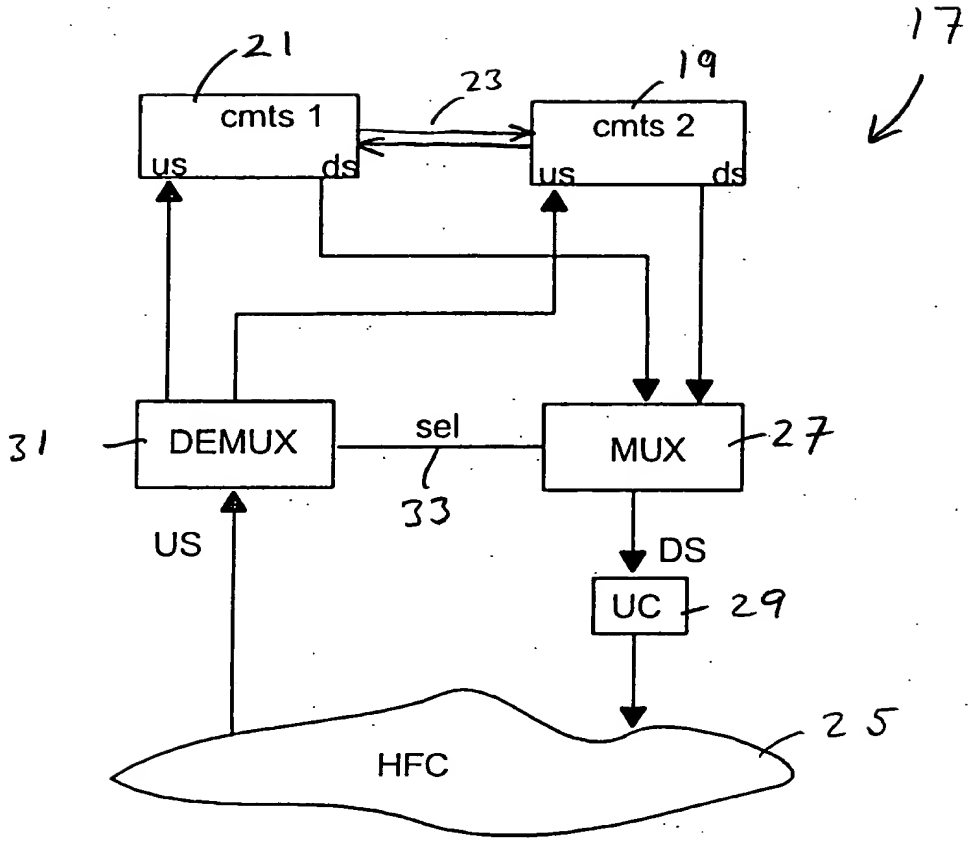
17
21
cmts 1
us
ds
23
19
cmts 2
us
ds
31
DEMUX
sel
33
MUX
27
US
DS
UC
29
HFC
25

Figure 2B

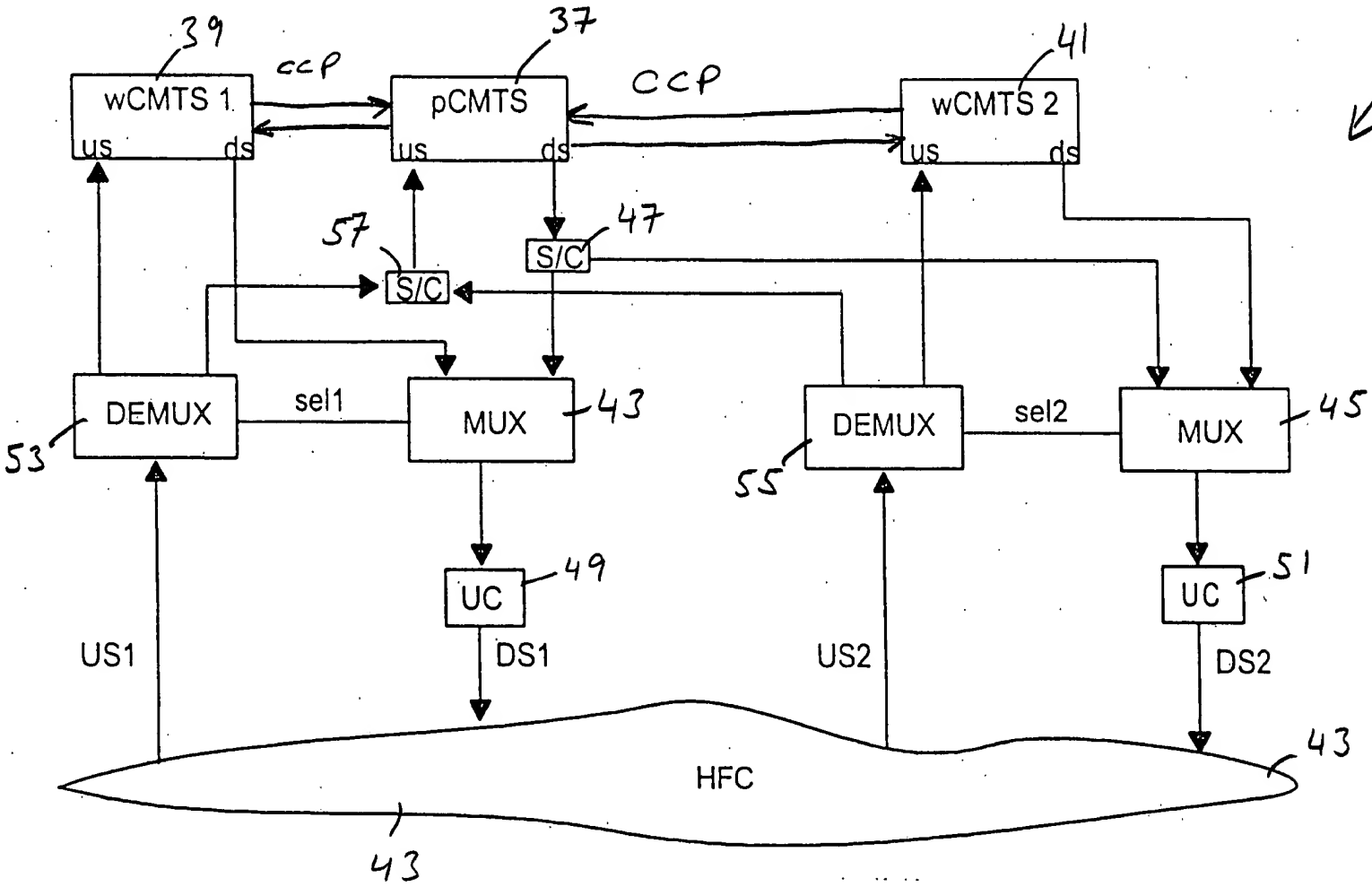

Figure 2C

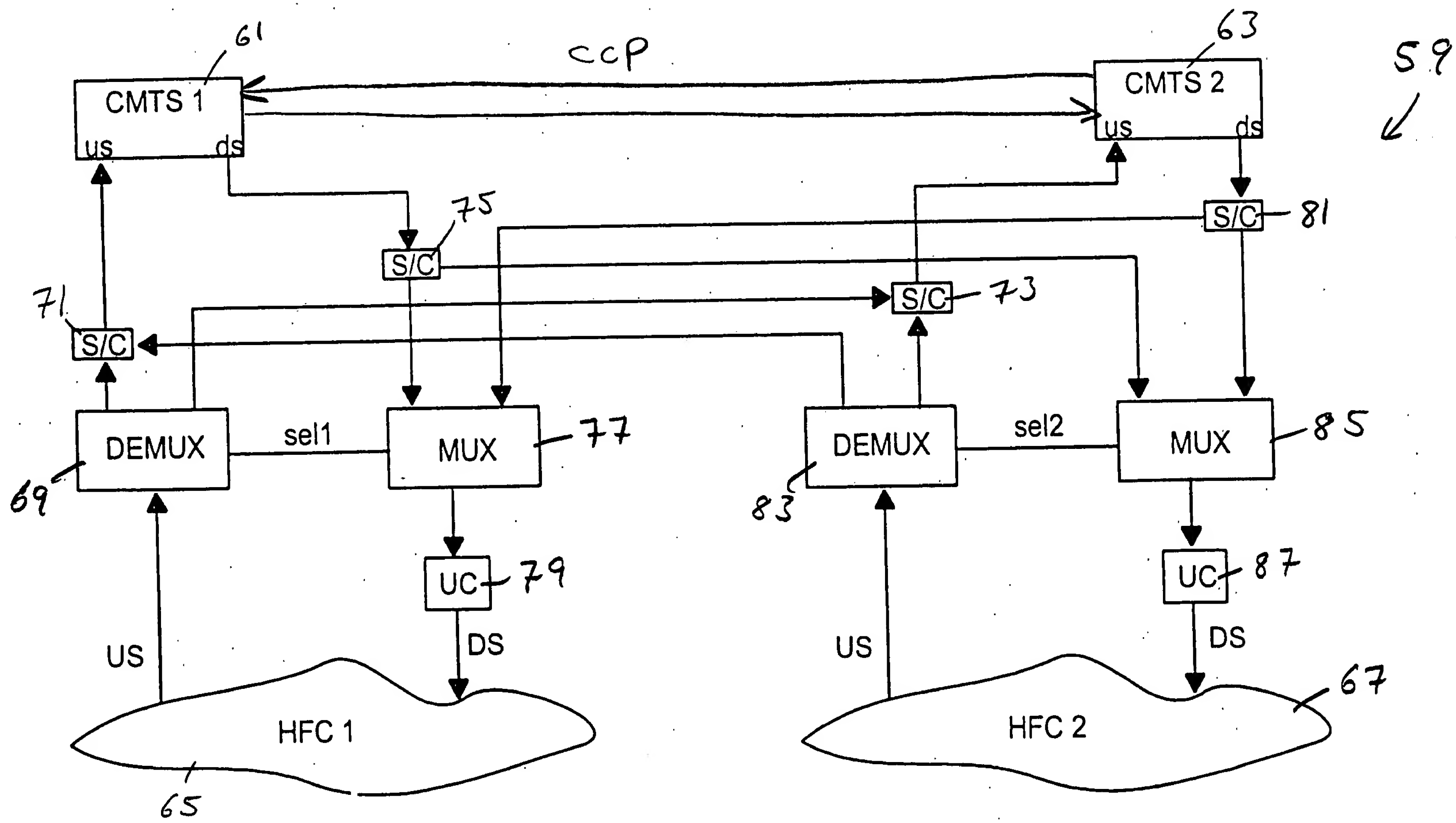

Figure 2D

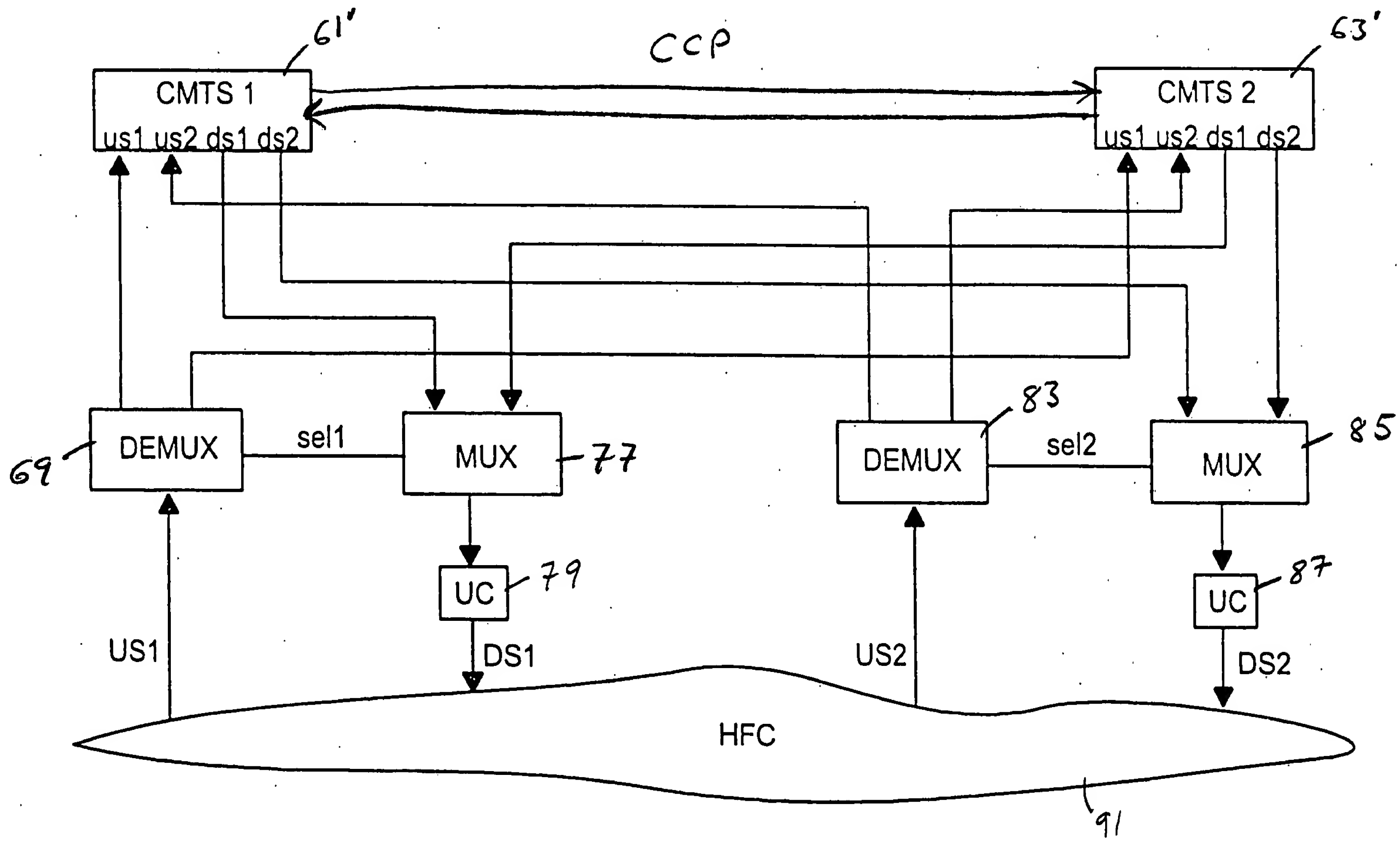
61'
CCP
63'
CMTS 1
us1 us2 ds1 ds2
CMTS 2
us1 us2 ds1 ds2
69
DEMUX
sel1
MUX
77
83
DEMUX
sel2
MUX
85
UC
79
UC
87
US1
DS1
US2
DS2
HFC
91

Figure 2E

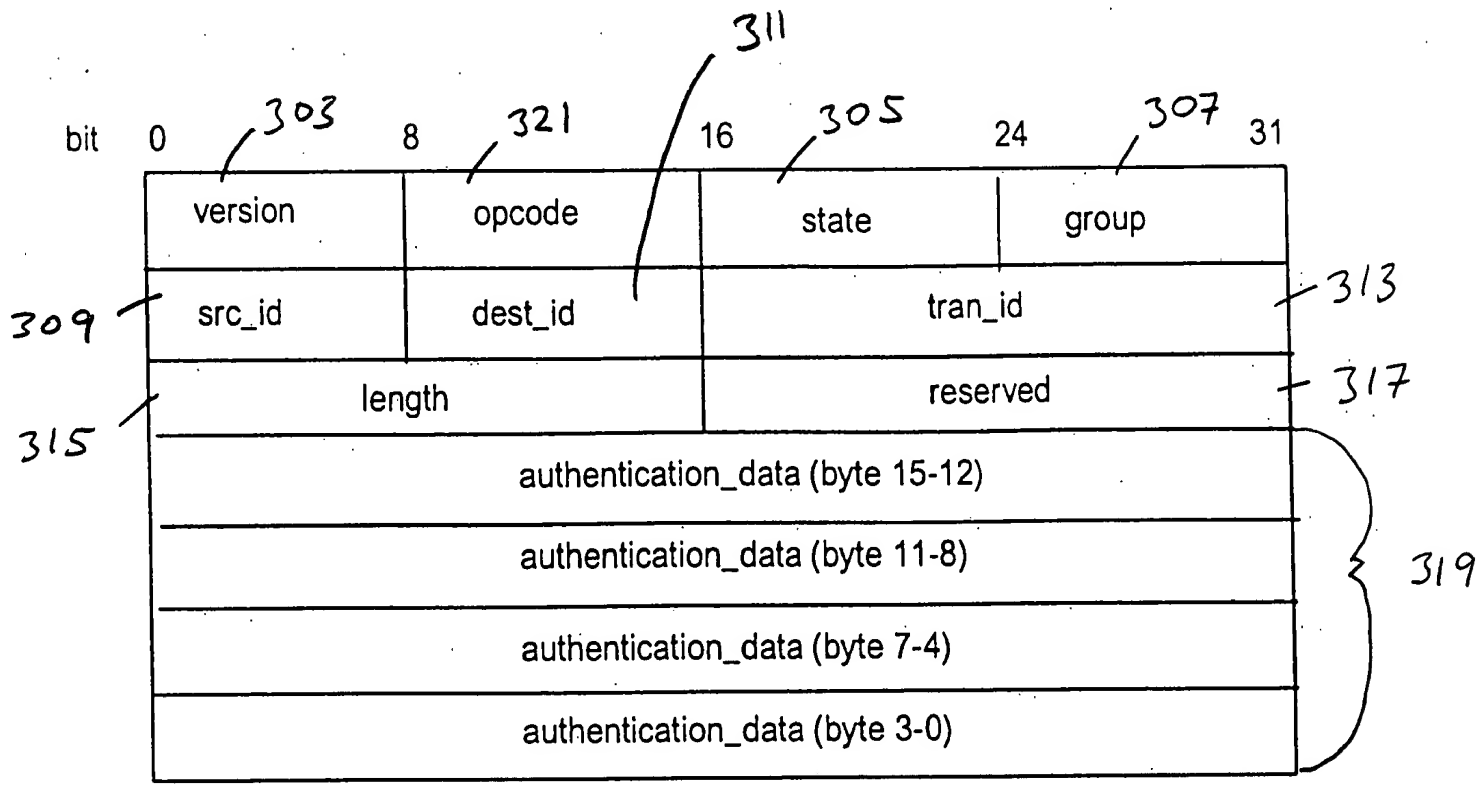

Figure 3A

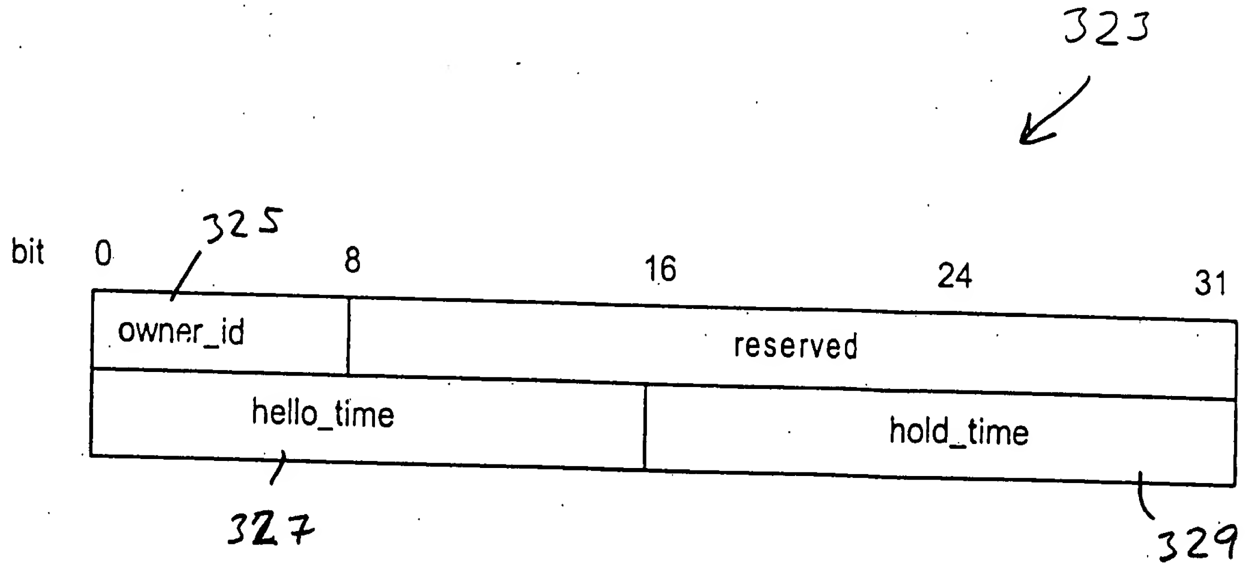
323
bit
0
8
16
24
31
owner_id
reserved
hello_time
hold_time
325
327
329

Figure 3B

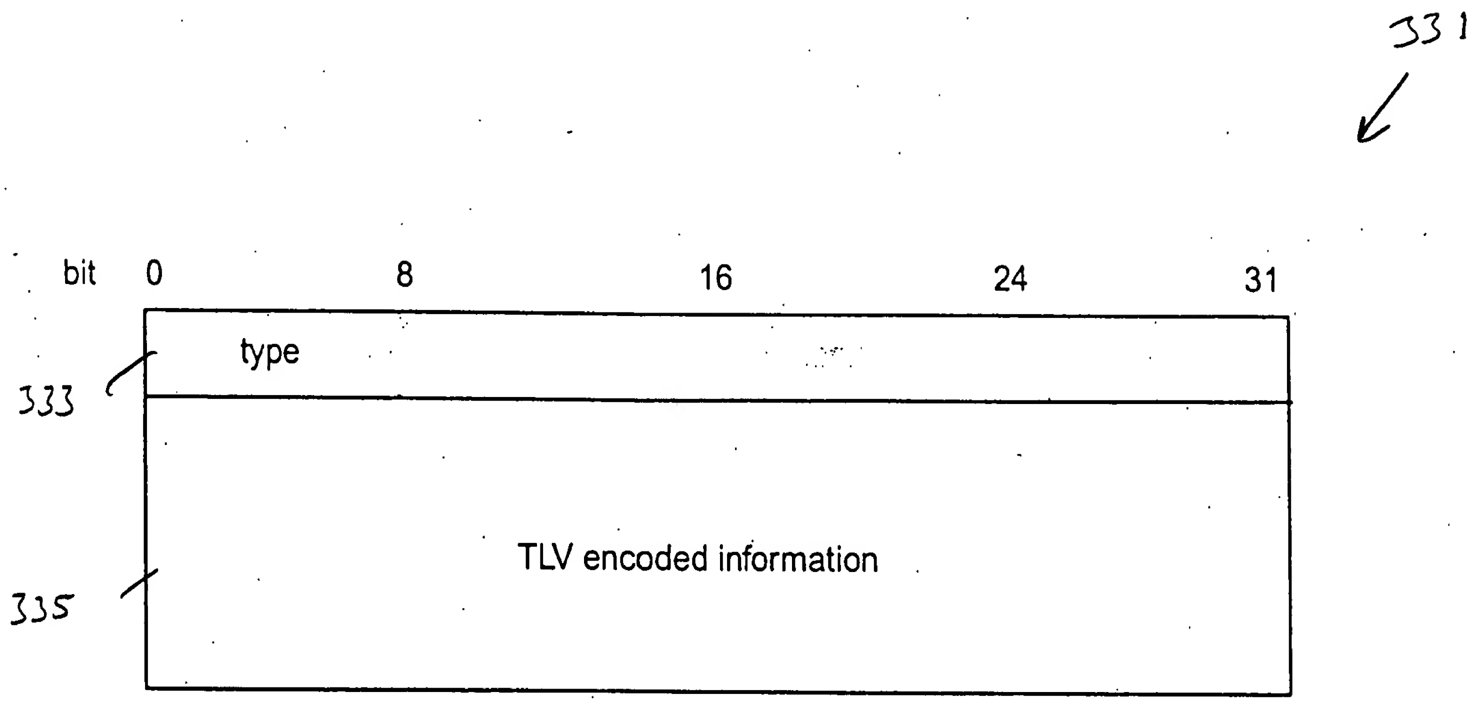

Figure 3C

Value Message	Name Message	Description
1	LOCKOUT	Teaching wCMTS tells pCMTS that it is not switchable.
2	UNLOCKOUT	Teaching wCMTS tells pCMTS that it is switchable.
3	RESYNC	Teaching wCMTS tells pCMTS that it is performing resync its entire database.
4	REG CM	Registration. Contains DOCSIS REG_REQ TLVs.
5	UCD	Upstream channel description. Contains DOCSIS UCD TLVs.
6	RNG	CM Ranging. Contains DOCSIS RNG_RSP TLVs.
7	DSA	CM Dynamic service add. Contains DOCSIS DSA_REQ TLVs.
8	DSD	CM Dynamic service delete. Contains DOCSIS DSD_REQ TLVs.
9	DSC	CM Dynamic service change. Contains DOCSIS DSC_REQ TLVs.
10	BPKM	CM Baseline privacy key management. Contains DOCSIS(8) TLVs.
11	SNA	Subnet add. Contains the MAC and IP address and IP mask for the sub-interface of CM and CPE to be added: 6 bytes MAC address, 4 bytes IP address, 4 bytes IP mask.
12	SND	Subnet delete. Contains the MAC and IP address and IP mask for the sub-interface of CM and CPE to be deleted: 6 bytes MAC address, 4 bytes IP address, 4 bytes IP mask.
13	SYNC	Time synchronization. Contains DOCSIS SYNC Timestamp.
14	~255	Reserved for future use.

Figure 4

State	wCMTS	Behavior
w_init	hccp->active = NULL; hccp->standbylist: 0 element;	transition state during initialization.
w_standalone	hccp->active != NULL; hccp->standbylist: 0 element;	**forwarding traffic;**
w_teach	hccp->active != NULL; hccp->standbylist: 0 element;	**forwarding traffic;** receive HELLO; send HELLO_ACK; send SYNC; receive SYNC_ACK;
w_learn	hccp->active = NULL; hccp->standbylist: 1 element;	receive HELLO; send HELLO_ACK; receive SYNC; send SYNC_ACK;

Figure 5A

State	pCMTS	Behavior
p_init	hccp->active = NULL; hccp->standbylist: 0 element;	transition state during initialization.
p_standalone	hccp->active != NULL; hccp->standbylist: n-1 elements;	**forwarding traffic;** send HELLO; receive HELLO_ACK; receive SYNC; send SYNC_ACK;
p_teach	hccp->active != NULL; hccp->standbylist: n-1 elements;	**forwarding traffic;** send HELLO; receive HELLO_ACK; receive SYNC; send SYNC_ACK; send SYNC; receive SYNC_ACK;
p_learn	hccp->active = NULL; hccp->standbylist: n elements;	send HELLO; receive HELLO_ACK; receive SYNC; send SYNC_ACK;

Figure 5B

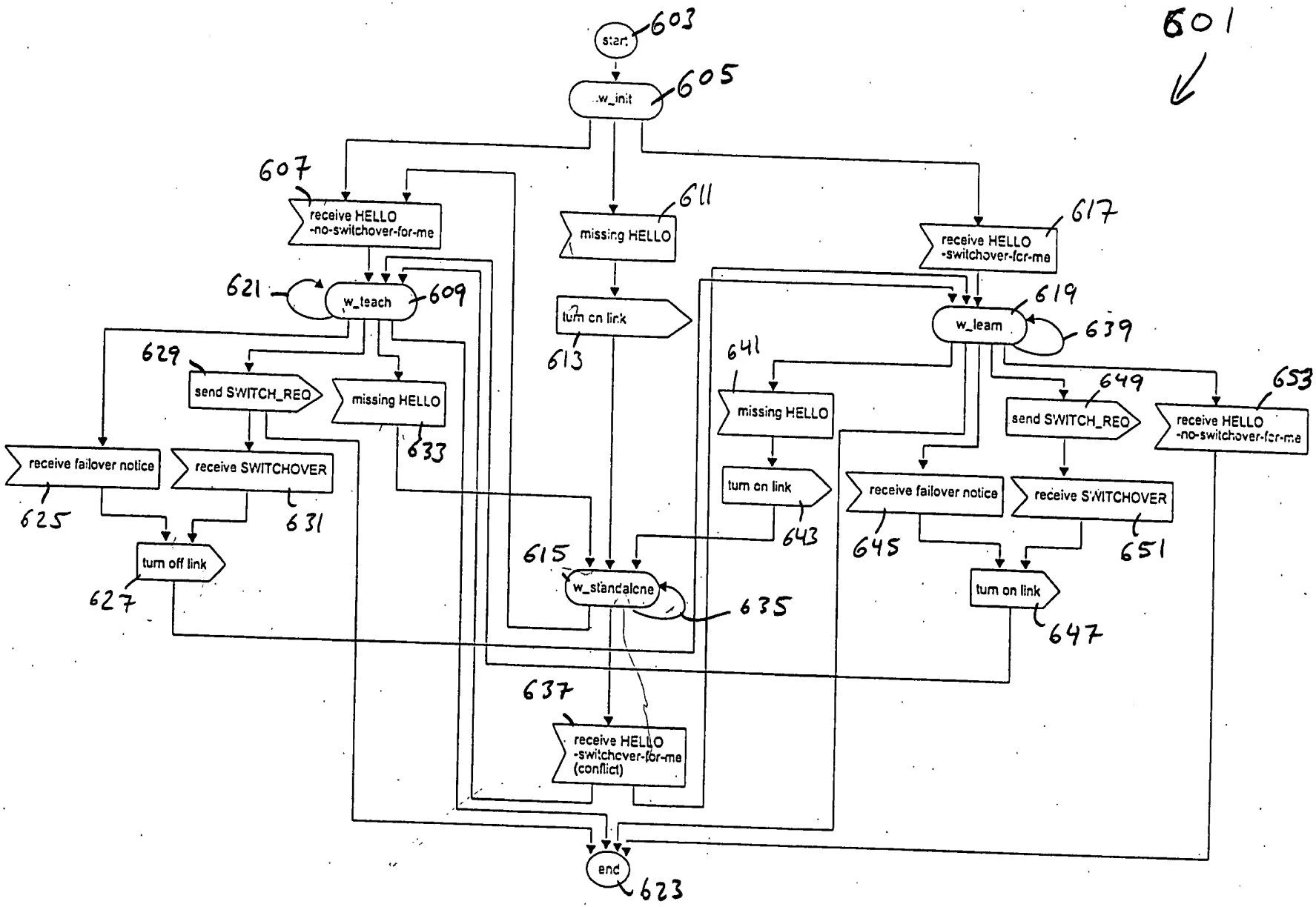
601
start
603
w_init
605
receive HELLO -no-switchover-for-me
607
missing HELLO
611
receive HELLO -switchover-for-me
617
w_teach
609
621
turn on link
613
w_learn
619
639
send SWITCH_REQ
629
missing HELLO
633
missing HELLO
641
send SWITCH_REQ
649
receive HELLO -no-switchover-for-me
653
receive failover notice
625
receive SWITCHOVER
631
turn on link
643
receive failover notice
645
receive SWITCHOVER
651
turn off link
627
615
w_standalone
635
turn on link
647
637
receive HELLO -switchover-for-me (conflict)
end
623

Figure 6

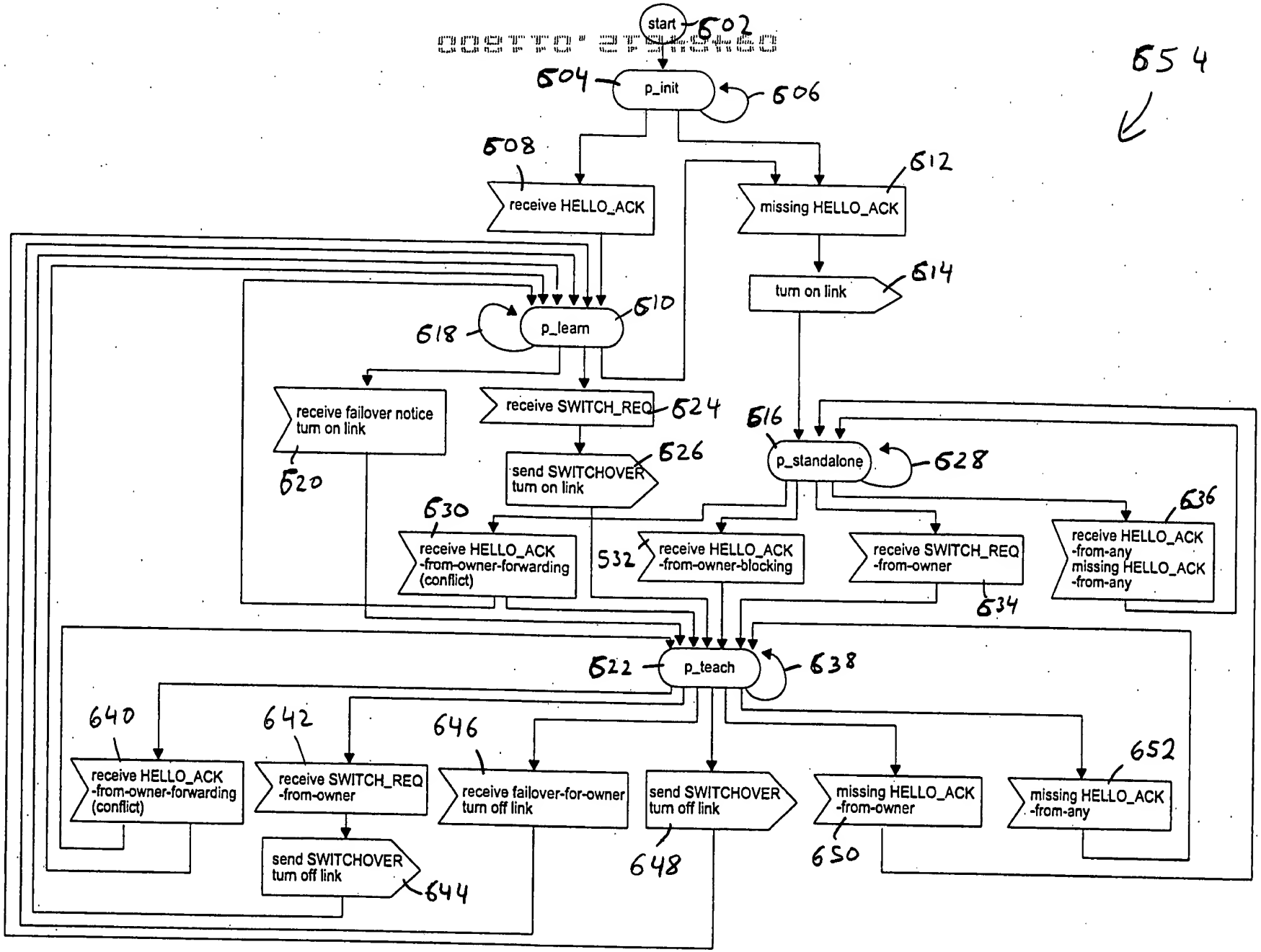
start
502
504
p_init
506
508
receive HELLO_ACK
512
missing HELLO_ACK
514
turn on link
610
p_learn
618
receive failover notice
turn on link
520
receive SWITCH_REQ
524
send SWITCHOVER
turn on link
526
616
p_standalone
628
530
receive HELLO_ACK
-from-owner-forwarding
(conflict)
532
receive HELLO_ACK
-from-owner-blocking
receive SWITCH_REQ
-from-owner
634
636
receive HELLO_ACK
-from-any
missing HELLO_ACK
-from-any
522
p_teach
638
640
receive HELLO_ACK
-from-owner-forwarding
(conflict)
642
receive SWITCH_REQ
-from-owner
send SWITCHOVER
turn off link
644
646
receive failover-for-owner
turn off link
648
send SWITCHOVER
turn off link
650
missing HELLO_ACK
-from-owner
652
missing HELLO_ACK
-from-any

Figure 7

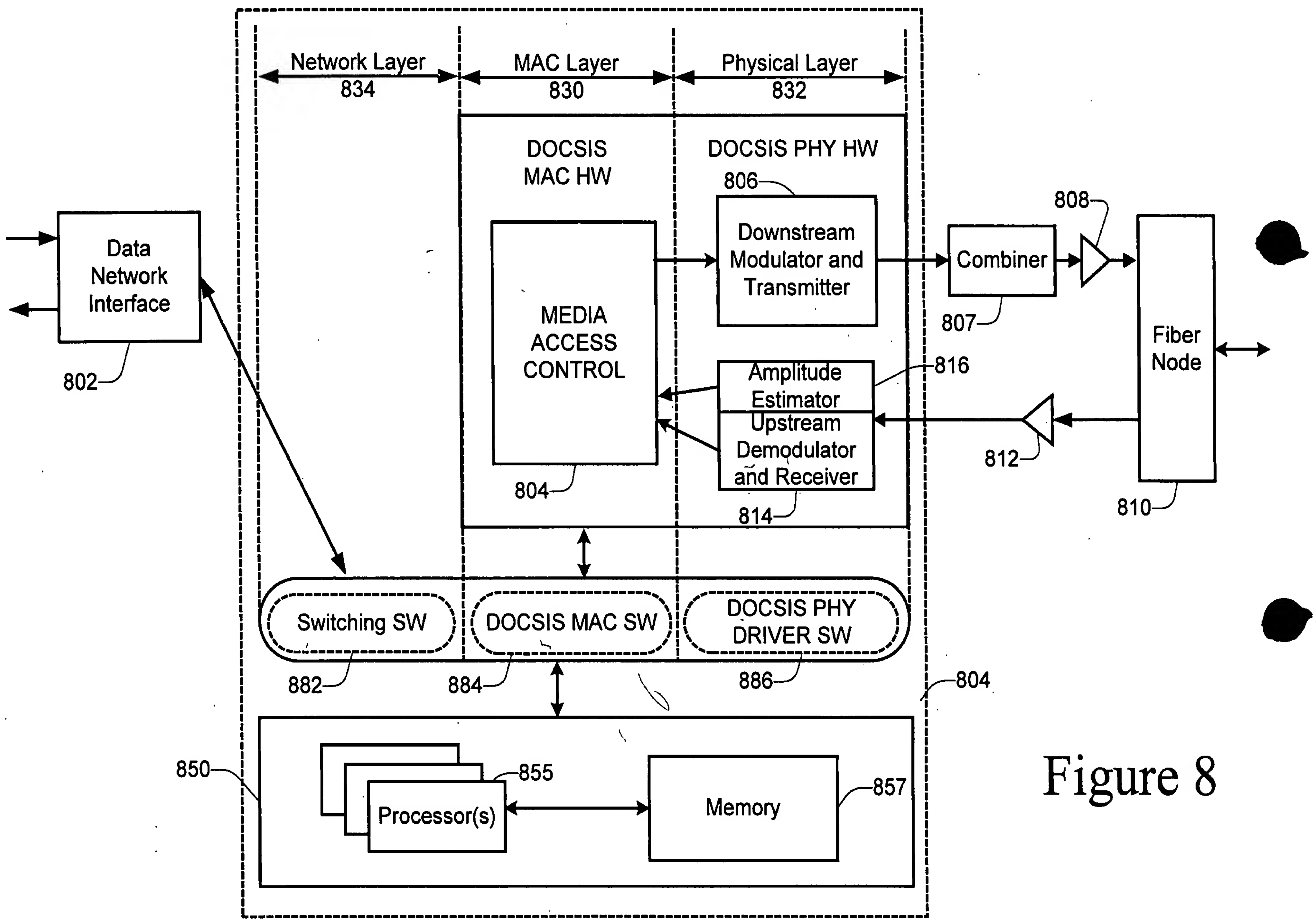
Network Layer
834
MAC Layer
830
Physical Layer
832
DOCSIS
MAC HW
DOCSIS PHY HW
806
Downstream
Modulator and
Transmitter
MEDIA
ACCESS
CONTROL
804
Amplitude
Estimator
816
Upstream
Demodulator
and Receiver
814
Data
Network
Interface
802
Combiner
807
808
Fiber
Node
810
812
Switching SW
882
DOCSIS MAC SW
884
DOCSIS PHY
DRIVER SW
886
804
850
Processor(s)
855
Memory
857

Figure 8

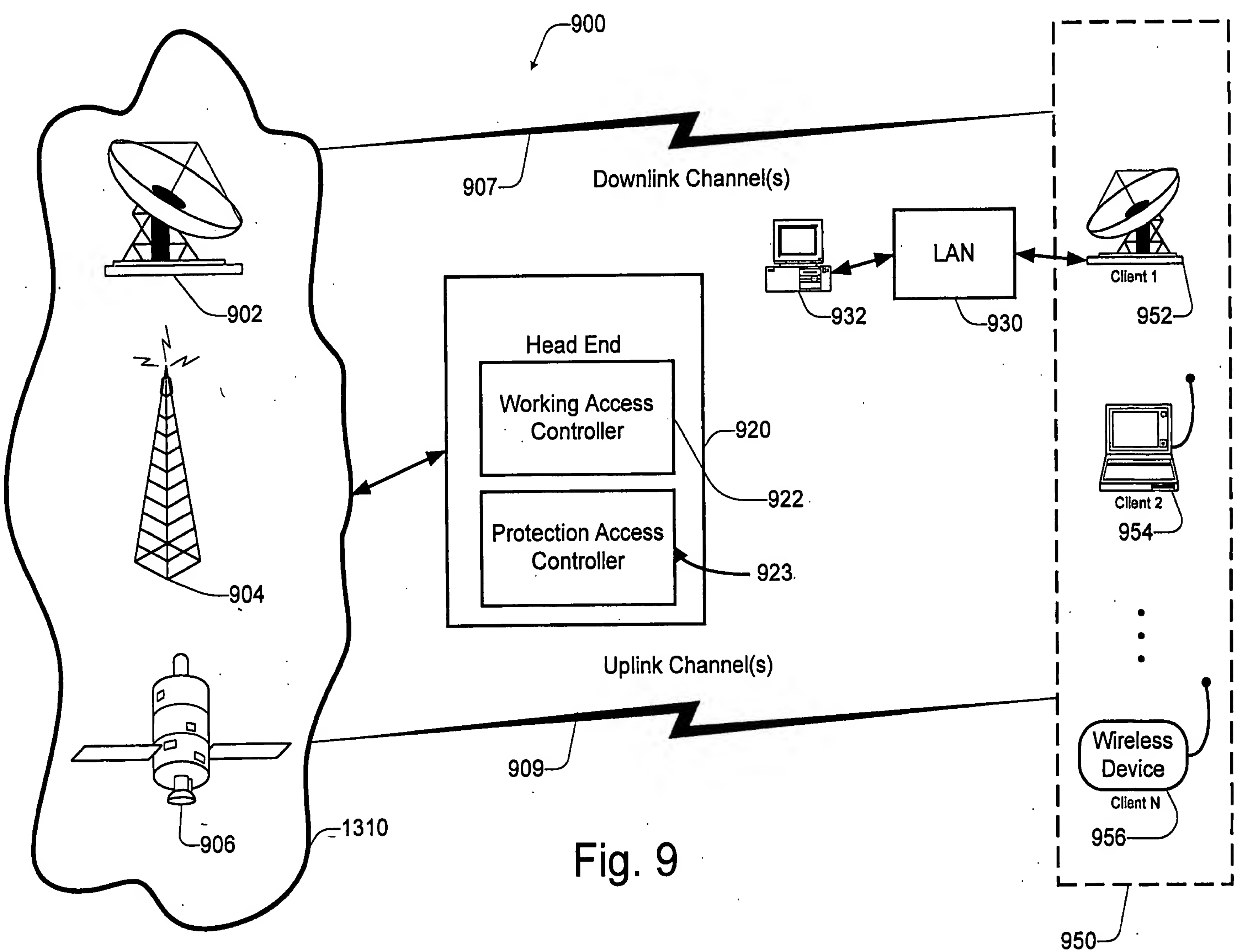
900
907
Downlink Channel(s)
902
904
906
1310
Head End
Working Access Controller
Protection Access Controller
920
922
923
LAN
930
932
Client 1
952
Client 2
954
Wireless Device
Client N
956
950
Uplink Channel(s)
909

Fig. 9